VIDEO
POST-PRODUCTION

INTRODUCTION

Productions are created live with cameras, action and lighting. Video and audio switching, mixing and effects are done right on the spot. If a show is to be aired live, this is the only way it can be produced. Quite often, a lot of the required recorded material is already available, or else it is more convenient to shoot various sections separately and then combine them in the quiet atmosphere of a technical facility. This is called post-production. Post-production can be quite a lengthy and tedious process, as several segments of material are assessed, and then "spliced" together to achieve the final product. A great deal of care if often taken, with accurate timing in the inter-relation between the video and audio portions of the tape. Post-production tapes tend to be of very high quality, with many creative effects. A one minute commercial, may have as many as 70 different edits. Because of the time consuming nature of post-production, it is worth paying a great deal of consideration to the purchase of equipment. Knowing the limitations and advantages of various types of devices is a great help especially if there is a probability of expansion in the future. As with anything else, if consideration is not given to expansion, you may have to obsolete perfectly good equipment; or find you may have to expand in a direction you did not want to go, merely because of the prohibitively high cost of replacing equipment.

There are several types of editors and video tape recorders on the market. This booklet explains the basic process and mechanism of editing together with the advantages and limitations of various approaches.

Color tape recorders use several different widths of tapes from ¼" to 2". 2" machines are largely outdated. Most of the machines now in use are Helical scan; ¾" and 1" being the most common for professional use. Helical scan machines have a rotating head wheel and tape that wraps around a drum. The rotating head wheel records or plays back a complete field of video during each revolution. If the tape is stationary, the output of the VTR is a "Still Frame". Audio is recorded along a track on the tape. For any tape recorder to produce an output, it is necessary to have relative motion between the playback head and the tape. When the tape on a VTR is stationary, there is no audio output. However, there is a video output, because the head wheel keeps on spinning, producing a relative tape to head movement.

Another important signal recorded on a VTR is the control track. This is similiar to an audio track, and is used to maintain a positioning reference for video. The control track signal is internally generated by the VTR.

Editors are devices for controlling tape machines. They vary in complexity from one's capable of controlling only one play back and one record machine, to others capable of controlling many playback machines, by causing them to stop, reverse, fast forward or play at normal speeds. The record machine is controlled in the same way with the addition of "record" commands.

The source material for an edit may come from VTR's, cameras, film chains, etc.

VTR'S & TIME CODE

The video output from a tape recorder, exhibits a phenomenon called time base error. This is just an eloquent way of saying that the output is not stable. When the video output is displayed on a monitor, it looks quite stable, because the monitor circuits are designed to lock onto the jittering signal and to follow the error.

It is important to understand the concept of time base error, or jitter, since it's characteristics can sometimes be used to advantage. Imagine a monitor driven from a stable sync source (some monitors have an external sync input and can be driven this way). If the output of a VTR is feed to this monitor, the picture will be distorted, some lines will appear to be shifted to the left and others to the right. The monitor is displaying the time base error of the signal. A device which corrects this error is called, rather aptly, a time base corrector.

It will be apparent at this point, that if you took the direct outputs of two VTR's and tried to mix them, there would be a problem. Each machine has it's own time base error which continously varies. Two machines can never have the same time base error. Imagine the picture on the monitor distorted one way in the case of one VTR and a different way in the case of the other VTR. If you tried to lay one picture over the other, they will not match. This is exactly what happens when you try to mix the two signals. For the same reason, you cannot mix the direct output of a VTR to that of a stable source such as a camera.

There are two ways of mixing signals from a VTR. The first is to use time base correctors to convert the unstable signals from the VTR's, into stable signals, and then to mix them. The second is to make other sources follow the jittering signal from any one VTR.

The second solution will only work if the signal sources can be pulled to follow a time base error. Not all signal sources can. For instance VTR's cannot be pulled in this manner. If you want to mix the output of two VTR's, you will need two time base correctors. There is no other way. It is sometimes possible to mix between a VTR and a camera. This depends on the make and model of the camera, and whether or not it is capable of following a VTR. Fortunately most black and white cameras will follow time base jitter with no problem which is very convenient for superimposing titles on material which has already been recorded. Many color cameras can also follow a VTR.

It is necessary to have a sync generator which is capable of following the time base jitter in tape machines; and to genlock that generator to the VTR. The output of the sync generator is then used to drive all the other devices being used for the editing process.

A point with remembering is that, by locking the other sources to a jittering signal, the final signal emerging from the processing device (switcher) is naturally also a jittering signal. When this signal is recorded on a record tape machine and then later played back; the second generation signal thus produced has twice the jitter of the original signal (the jitter of the second machine added to the jitter of the first machine). The second generation tape, made in this manner, is usually acceptable for most non-broadcast use. When further generations are made, the signal gets progrssively worse. It is possible, by putting a second or third generation tape through a time base corrector, to remove the jitter completely. However, there is still a small residue left. This is because the original genlocking sync generator, which locked to the jittering output of the first VTR, was not able to follow the jitter completely and consequently the relative jitter between the two mixed signals on the second generation tape is more that would otherwise have been the case. Nevertheless quite acceptable results can be achieved by putting a second or third generation tape througha time base corrector.

Though, as we mentioned earlier, it is not possible to mix between the signals of two VTR's without using time base correctors; it is still possible to perform "cuts" between them. This is because most playback machines can be made to lock vertically to one another. In our previous analogy,what this means is, that the signals have horizontal and color shifts, but that the frames still lie one over the other. It is therefore possible to perform a vertical interval switch (or cut) between the signals of two machines. The process works for a cut and not a mix because when a mix is performed you are mixing the pictures line by line, every line, all the way down the picture. A cut is a one time occurence. As long as the cut is performed during the vertical interval, you will not see it. Obviously, if the cut occured in the middle of the frame, you would be jumping from a line misplaced one way, to another line misplaced another way, and you would see a tear.

VTR's can go forward or backward, at higher or lower then normal playback speed. The speed and direction of motion can be externally controlled by an editor.

Material recorded on a tape is logged by frames. There are approximately 30 frames per second of normal playback time.

CONTROL TRACK:

VTR's have a control track on the tape, on which one pulse is recorded, for every frame of video. By counting the number of pulses and by keeping a check of the direction of travel, it is possible to follow movements of the tape as it shuttles back and forth during editting sessions. Control track pulses are sometimes used as a reference to establish edit points. There are two major drawbacks in using them. First, there is no absolute way of identifying any given frame. If the tape is removed from the machine and then reinserted in a slightly different position, all reference is lost. It then becomes necessary to set up a new datum. Second, since the output of a tape head depends on a relative tape to head speed, it is quite easy to miss control pulses when the tape is moving slowly or is reversing direction.

SMPTE TIME CODE:

A better means of keeping track of locations on a tape, is by means of the SMPTE time code. This code uses up one of the audio tracks on the tape. However, each frame has it's own specific number allocated to it and this number is recorded on the tape. A special device called a time code generator is necessary to lay down the code on the tape. A time code reader, reads this code during editing sessions. The reader can read the code even at fast forward or reverse speeds. At very slow speeds the reader cannot operate properly, which is not of any great significance, because whenever the tape is speeded up again, the exact location is immediately known. The drawback to this system is the loss of the audio track on which the time code is recorded.

OTHER SYSTEMS:

There are two interesting variations to the above systems. One system puts the SMPTE time code on the video during the vertical interval. This frees up the audio track, but creates another problem. Many devices (including the orginating tape machine) regenerate and cleans up the vertical interval in the signal, thereby cleaning off the time code.

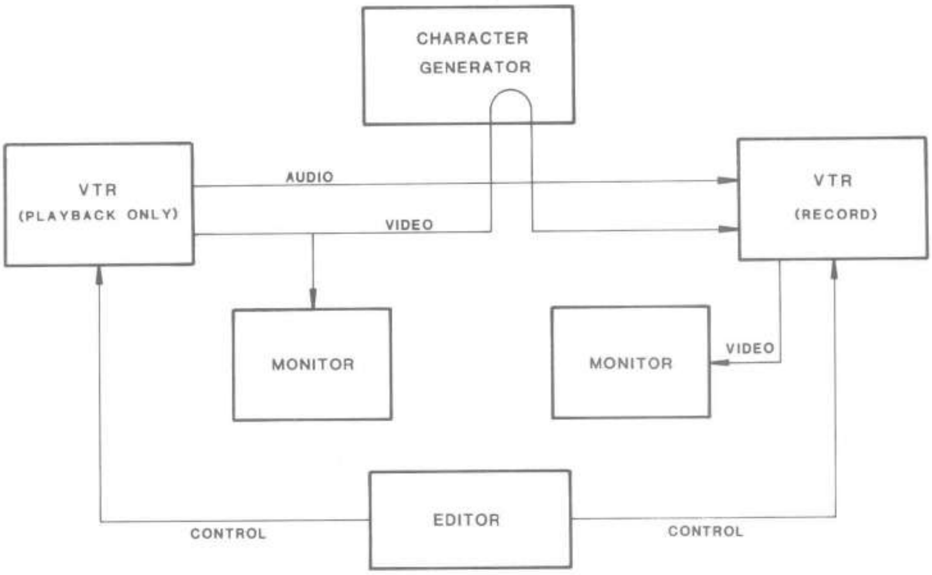
The other variation which counts control tracks, is called MICRO LOK™. This system modifies the control track signal shortening every hundredth control pulse. This short pulse is used to reset counters. The principle here, is that even if a few pulses are lost in shuttling, the counters can be reset each time a short control pulse is encountered and recognized. It is assumed, correctly, that you cannot lose over 100 pulses in any one shuttling operation. To obtain absolute positional accuracy, the tape has to be rewound to a start point in order to obtain a datum, and then rolled forward to the required point of edit.

FRAMING:

Frames in video are analogous to frames in a movie film, You can not splice a film by cutting anywhere. If you do, when that film is run through the projector it will be necessary to move the gate up or down to accomodate the new sequence of frames. The same thing applies to video. If edits are not made correctly at the vertical interval, a roll will be seen on the monitor when the tape is played back. However, there is an important difference between video and film. In film all frames are the same. In video there are two fields to a frame. One field is composed of all the odd lines in the frame and the following field has all the even lines. When editing, it is necessary to make sure that the recorded material has the same odd field followed by even field sequence. If two odd fields or two even fields follow one another, it creates a problem. In addition to the odd-even field problem there is also a question of color framing, which has to be correctly addressed for a clean edit.

SIMPLE CUT EDITS

With the arrangement shown in Fig. 1 below, it is possible to perform cut edits. This system will permit sections of material on one tape to be rearranged in a different order. It is possible to add parts of the contents of several tapes, one at a time, thus creating a new composite tape. The transition between each "splice" has to be a cut. No dissolves or wipes are possible. Also, the recording machine has to be one that has editing capability. Audio may or may not be switched along with the video.

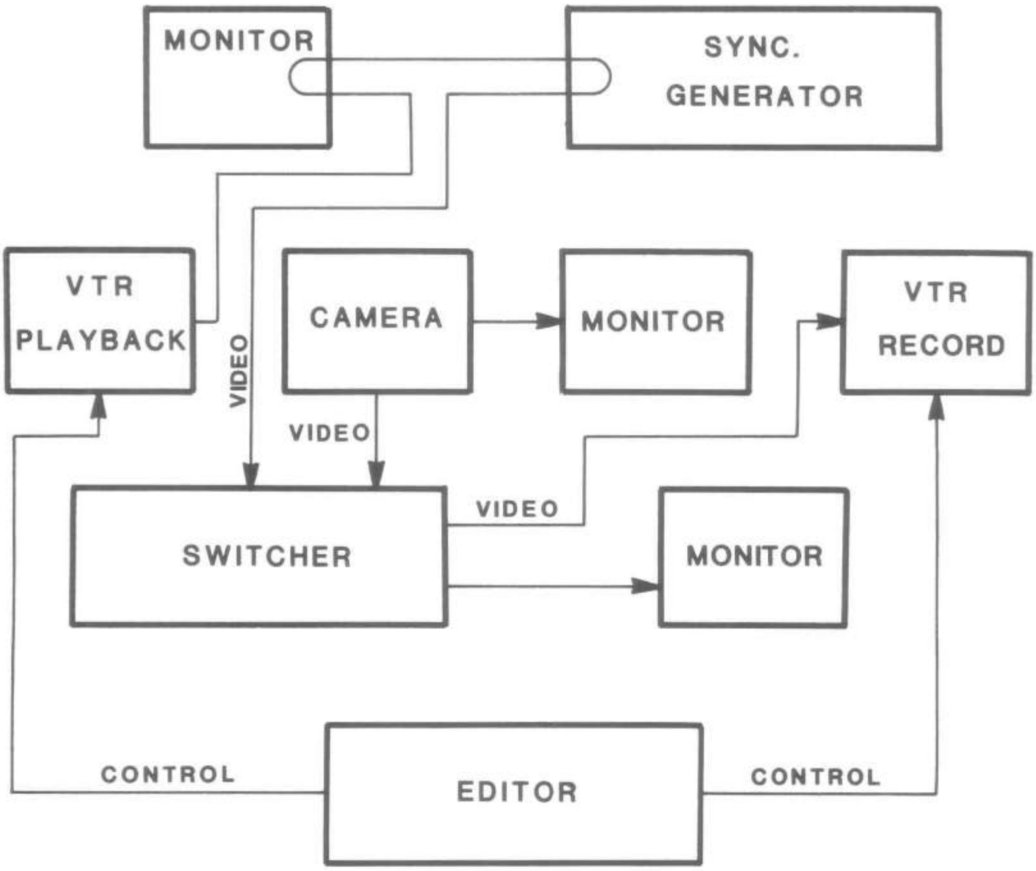


SIMPLE EDITING SYSTEM **Fig. 1.**

This is the simplest arrangement. The editor controls both machines. There are two monitors; one is fed with the output of the playback machine and the other is fed with the video from the record machine. The monitors enable the operator to visually examine the tapes and determine the points at which he wishes to have the edits. This system can only perform simple cut edits.

INCREASING THE CAPABILITY OF A SIMPLE SYSTEM.

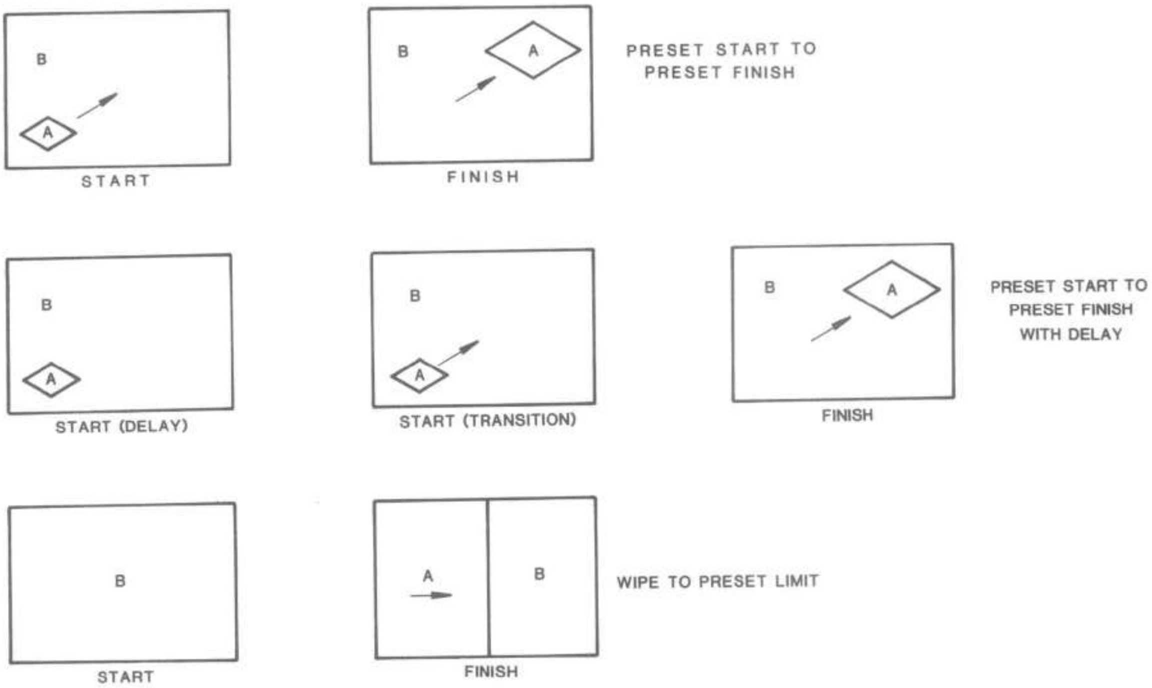
By adding a switcher and a camera, and genlocking the system to the VTR, it is possible to greatly enhance the effects capability of the final tape. For instance, instead of merely performing cut after cut on each edit, you can now mix out of a VTR segment to the camera on one edit, and then follow that with another edit dissolving from camera to VTR. The final result will seen like two mixes following one another, when it is correctly performed.



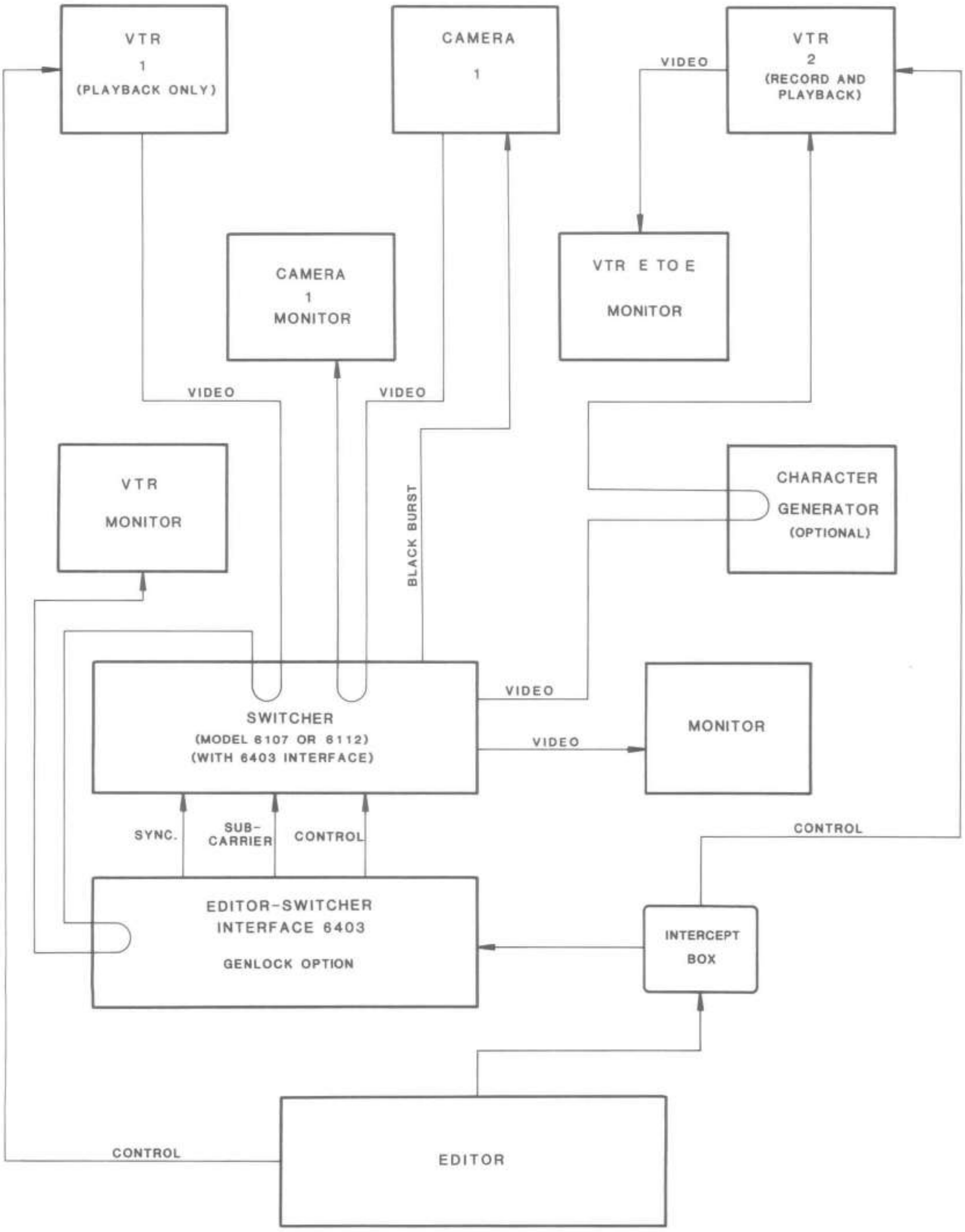
ADDING MIX AND EFFECTS CAPABILITY Fig. 2.

ENHANCING MIX AND EFFECTS CAPABILITY.

A 6403, Editor-Switcher active interface unit can be added to the system, greatly enhancing the effects capability. You can now produce controlled effects, such as patterns moving across the screen precisely, from one predetermined location to another. Both the positioner and size of patterns are accurately controlled by the 6403. The 6403 can produce a wipe to a split screen, or a dissolve to a predetermined proportion.



EXAMPLES OF EFFECTS CAPABILITY OF THE 6403 Fig. 3.



GENLOCKING A SYSTEM TO A VTR **Fig. 4.**

This arrangement allows live action to be added to recorded material. It is possible to mix from the recorder to a signal fromthe camera, or to add effects such as a corner insert with an announcer appearing within it. The 6403 Editor-switcher interface (with the Genlock option) performs two functions. (a) it generates sync and subcarrier from the VTR's video signal and drives the switcher, which in turn generates black burst to drive the camera, and (b) it intercepts the trigger signal from the editor to the VTR, and uses that signal to initiate a switch or transition for effects. The 6403 can be programmed to perform partial wipes, such as a corner insert which opens up and then stops at a preset point, or a diamond wipe which opens up from one of the corners and stops at a precise location on the screen. For simplicity audio is not shown here. The 6803 audio follow mixer is a very useful accessory.

THE PROCESS OF EDITING

The simplest editors control one playback and one record machine and operate on control track. They also only handle only one edit at a time. The more complex ones handle several machines, can be made to store a series of edit points and types, and can them perform them automatically. Regardless of the complexity of the editor, or the system, each actual edit has to be performed one at a time and consists of the same basic operations.

Since tape recorders have to be brought up to speed before they are capable of producing an acceptable signal, all machines have to be pre-rolled before they get to the point on the tape where the edit is to occur. This pre-roll usually occupies a few seconds. During the pre-roll, the editor jockeys the machines to make sure they all arrive at the edit points at the same instant. Just prior to the edit, all machines are in the playback mode. The record machine gets an input video signal which it uses for the purpose of locking up. At the edit point, the record machine changes from the playback to the record mode, and starts recording the signal to which it has just locked up. (The record machine automatically erases all prior material, which was previously occupying the area of the tape it is now recording on).

As far as the record machine is concerned the mechanism of recording is as follows. Just prior to the record command, the machine is pre-armed to perform either a video or an audio edit. At the instant the machine is actually supposed to go into record, it receives a "cut in" or "record command" pulse. The machine then goes into either video or audio record depending on what it has been primed to do.

Consider a simple cut edit. There is a segment 'A' on the record machine, and a segment 'B' on the playback machine. Let us assume that we wish to keep the first half of segment 'A', and to replace the latter half of segment 'A' with the latter half segment 'B' (which is on the other machine). Both machines are pre-rolled for a few seconds, so that they both arrive at the center point of the two segments at the same instant. At that point, the record machine goes into record, and starts recording whatever is being fed into it from the playback machine, which of course is the latter half of segment 'B'. Since the playback machine never goes into record or erase, the whole of segment 'B' (which is the original source material) is left intact.

In a more complex system where there is multiple roll capability (A-B roll, or A-B-C roll) more than one playback machine is controlled by the editor. All machines are made to pre-roll and controlled so they all arrive at the edit point at the same instant. Each playback machine has a timebase corrector, and their outputs are fed to a switcher capable of executing mixes and effects. Let us assume there is a segment 'C' on the second playback machine, and that we wish to perform a dissolve from the first playback machine to the second playback machine at the instant of edit. The switcher used for the pupose has at least two buses. There is a FROM bus and a TO bus.(These are often called the Program Bus and the Preview Bus. The FROM or the Program bus is what the switcher is presently feeding out; the TO or the Preview bus is the signal that the switcher will be mixing or wiping to). The output of the switcher if fed into the record machine. As the machines pre-roll, the record machine is being fed the signal from the first playback machine. The record machine locks up to the signal. The two timebase correctors are locked to one another, so that the signals they are putting out are exactly in phase with one another. As all three machines come up to the edit point, the switcher is still feeding out the signal from the first playback machine (the 'B' machine). At the edit point the record machine starts recording the signal being fed to it. At the same time the switcher is commanded to perform an automatic mix, and it starts mixing the signal from 'B' to 'C', finishes the mix and ends up with feeding out the signal from the second playback machine (which is 'C'). The record machine records all this.

Now let us back up the record machine to the start of segment 'A', put it into playback and examine what we have. The first part of the output will be segment 'A'. Half way down the segment, the signal will switch to 'B' and immediately begin a dissolve (or mix) to 'C', finally ending up with the latter part of segment 'C'. This is not a very effective or desirable edit. By switching to 'B' and then immediately starting a mix, the 'B' scene is on for only a brief instant before it gets dissolved out. It would be preferable to keep 'B' on for a few seconds and then dissolve out of it to 'C'. This is called a delayed effect, or a delayed transition and can be performed in two ways.

The first method of creating a delayed transition, is to perform two edits. The first edit would merely cut from 'A' to 'B' without any transition. Another edit must now be performed as described two paragraphs above, the only difference being that the second edit point must be a few seconds later (in playing time) than the first edit. If we now examine the recorded tape we would find the first segment of the 'A' material, then a cut to 'B' , then a few seconds of the 'B' material only, then a dissolve from 'B' to 'C' and finally the last segment of 'C' only.

A second and faster method of performing the delayed transition, is to delay the transition command to the switcher for a few seconds after the edit point. The more sophisticated editors are capable of sending out this delayed command. The sequence of events here is as follows. All three machines start on their pre-roll, at the edit point the record machine starts recording the output of the switcher, which is the 'B' scene, then a few seconds later the switcher receives a transition command pulse which starts a mix from 'B' to 'C', the switcher completes its transition and ends up feeding out the 'C' signal. This second method requires only one edit.

DIFFERENCE BETWEEN BASIC EDITING SYSTEMS

There is quite a big difference in price between an editing system capable of performing simple cut edits and one that can operate with two or more playback machines. The biggest cause for this difference is the cost of the timebase correctors. Editors and switchers go up in price with larger systems but there is no sudden jump in capability or price, as there is when the step is made between cut edits and A-B roll. In the next section we shall show how with an editor capable of only performing cut edits, it is still possible to add many interesting and usefull effects to the final recording

AUDIO

Audio is a significant part of editing. The recorded material may have audio on one or more tracks. Often it has program audio on only one track while the other audio track has a SMPTE time code recorded on it. ¾" machines have two audio tracks. If the material is recorded in the field usually only one audio track is used and there is no time code. Sometimes a portable time code generator is used in the field. In any case time code can always be added prior to editing. While editing, sometimes the audio is made to follow the video, while at other times it is more convenient to split edit.

An example of audio follow is where an outdoor scene is dissolved into a discussion between two people describing the scene, and the back again to the outdoor scene. In this case it would be nice to have the audio dissolve with the video.

An example of split audio, is where an announcer is first shown commenting on an outdoor scene, then the announcer is faded out and the outdoor scene brought in with the announcer's voice maintained through the scene, followed by a dissolve back to the announcer in video.

The 6803 is an audio follow switcher, which is capable of following the switching and mixing action of the switchers such as the 6107 and the 6112. Audio mixes follow the action of the switcher fader handle.

The 6800 is a programmable audio mixer, which is capable of accepting commands directly from an editor, such as input selection and duration times for mixes.

Both the 6800 and the 6803 have two gain controls (one for each track) on each of the inputs. They also have built in tone generators.

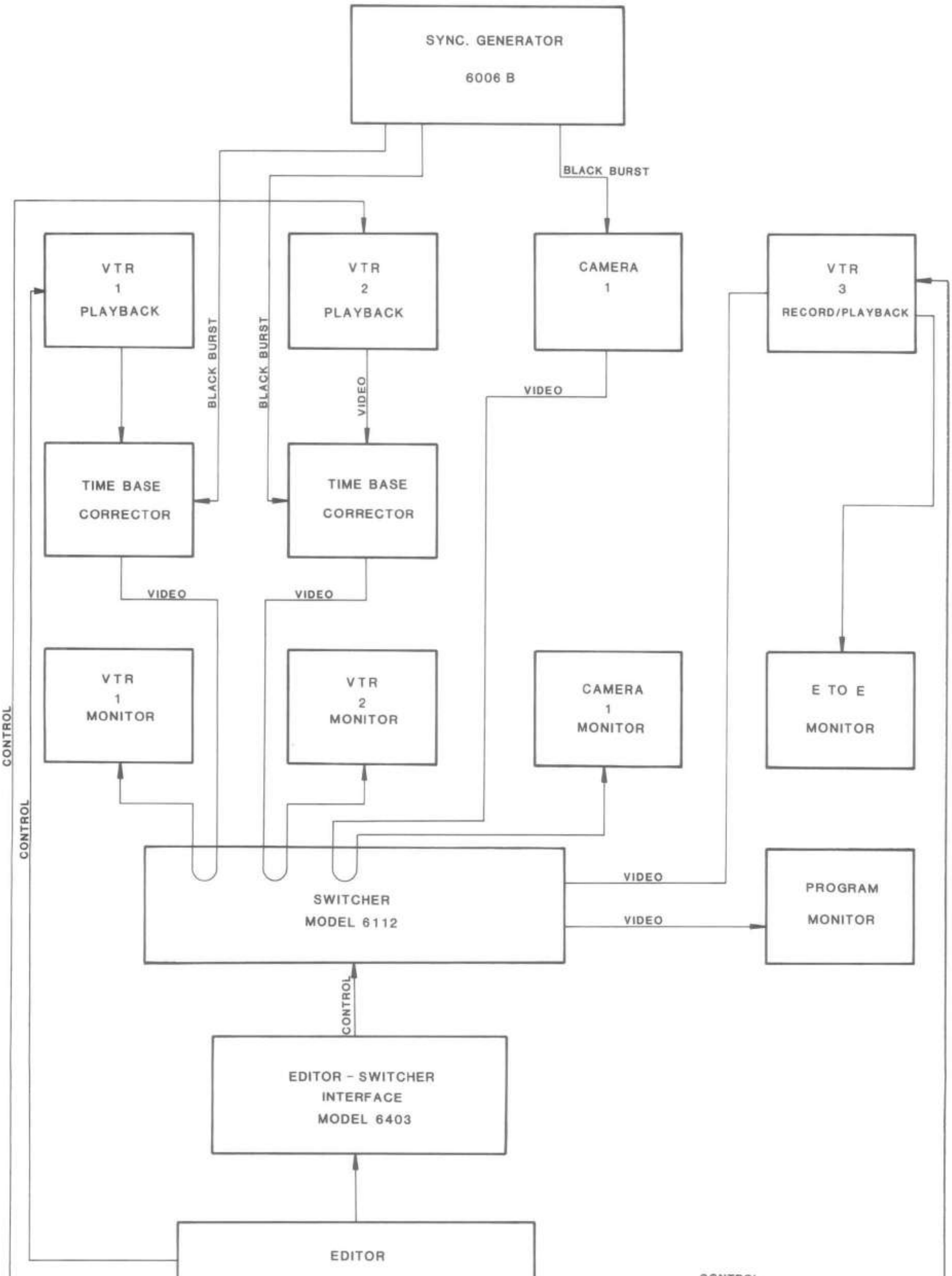
PERFORMING COMPLEX EFFECTS WITH AN INEXPENSIVE EDITOR

Let us start with an editor capable of perfoming cut edits only, two VTR's one for playback only and the other capable of record and playback. By adding a 6107 Switcher, a 6403 Editor-Switcher Interface (with genlock option) and a 6803 Audio Mixer, and a color camera capable of genlocking to a VTR; you can perform wipes and mixes between VTR and camera. Without a timebase corrector you can perform quite sophisticated effects such as:

(a) Delayed transitions
(b) Wipe to a present limit and hold, such as wiping to split screen.
(c) Move a pattern from one preset position to another preset position, both size and position being controlled by the 6403, and triggered by the editor.
(d) Wipes and mixes which are absolutely frame accurate.
(e) Switch or mix audio between VTR's.
(f) Add voice over.

The 6403 is a device which is capable of controlling one Mix-Effects system on switchers such as the 6107, 6112, 6124 and 6139. It has several modes of operation. By the touch of a button, it transfers all control to the switcher panel for manual operation. This allows the switcher to be used for normal production, such as between two or more cameras. Another mode allows the start and end points of a pattern to be precisely set from the 6403 panel. (An example is a diamond pattern which starts from the bottom right side of the screen and ends up as a pattern of an exact preset size over an object on the top left hand side of the screen. The 6403 has an internal frame accurate counter which permits transitions and delays to be precisely set from 1 to 1000 frames (1000 frames is 33 1/3 seconds). The delay and transition timers are independent, providing a total count of 2000 frames. The 6403 can be triggered either manually or by the editor. An interceptor box is available, which is inserted between the control cable connecting the record VTR and the editor. This interceptor box permits a simple connection, without modification to the editor or the VTR. The 6403 also has an optional editor module which enables it to accept direct commands from much more sophisticated editors. This will be covered in a later section.

A convenient addition to the system is a character generator, which may be inserted downstream to the switcher, on the cable connecting the switcher program output to the record VTR.



EDITOR WITH A-B ROLL CAPABILITY. Fig. 5.

PERFORMING COMPLEX EFFECTS WITH A SOPHISTICATED EDITOR

The 6403 interfaces with editors capable controlling video switchers, by means of an optional editor module. It accepts commands such as input selection, duration times, pattern type etc., and transfers them to the switcher it controls. The 6403 has several modes of operation. It can transfer all control to the Switcher panel, allowing the switcher to be used manually for program origination. It can also put one ME of the switcher under full editor control, leaving the rest of the switcher under manual control, which is the mode normally used for most edits. In this mode all selections can be made directly from the editor keyboard, without the necessity for repeating selections on the switcher panal.

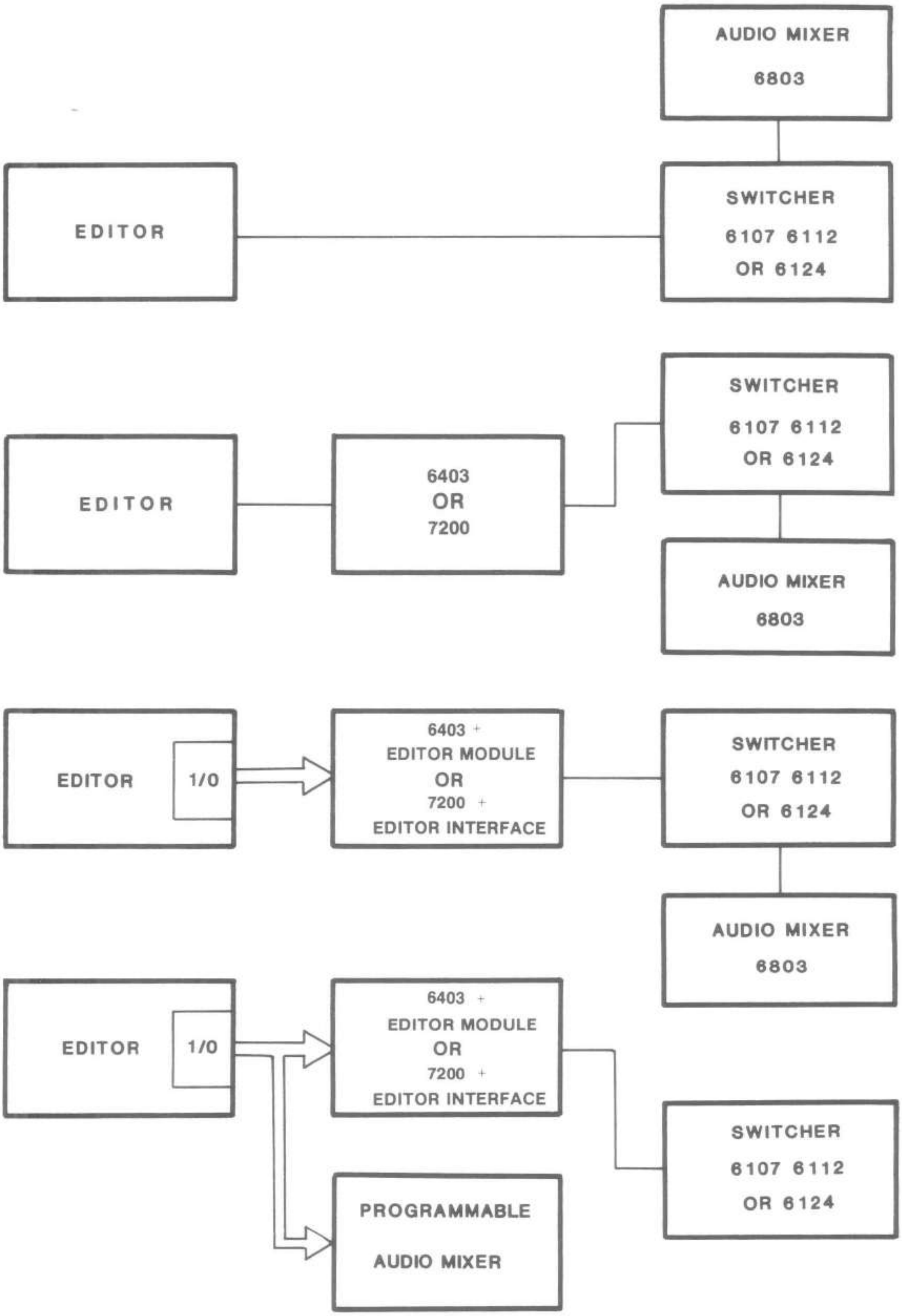
A very important feature of the 6403 is its ability to control the start and finish points of transitions with frame accurate precision. Most editors can call out a pattern and duration time and leave the actual execution to the switcher. Additionally the wipes are always run to completion. For many edits this is a very convenient mode of operation. When however, if is necessary to perform effects such as horizontal wipe which proceeds to the middle of the screen and stops there, or a circle insert which traverses across the screen and stops precisely around an object depicted on the screen, the 6403 is ideal. It controls the positoner in both X and Y axes, and the size of the pattern, for normal and reverse direction of travel.

Video switchers have an overrun on the fader handle in the wipe mode. This is necessary for the following reason. Assume the wipe only just barely opened up to maximum size when the fader handle reached its limit. This would be ideal if the positioner was set at its mid position. However if the positioner was set off center, when the fader handle reached its limit, the wipe would not be complete. For the switcher to operate normally, a certain amount of overrun is necessary. The effect of this is that during an edit, if a 180 frame wipe was called for, the actual duration would be considerably less. Quite often this is not of any major consequence, and would go unnoticed. In a tight commercial, it could be of great significance. This leads to a very useful feature of the 6403. It is possible to program the exact start and finish points of the effect, no matter how far off center the positioner is set, and still obtain the effect in exactly the number of frames programmed. The 6403 can be programmed to go from one preset level of mix to another, in an exact number of frames. It even has a delayed transition capability. The delay and transition timers can be independently set for duration times of up to 1000 frames, producing a combined total duration of 2000 frames.

The 6800 is a Programmable Audio Mixer, which can be either manually controlled from its own control panel, or driven from the editor, accepting commands such as mix duration times and bus selections. It has its own frame accurate counter, which can be externally controlled by the editor. The 6800 has all transformer coupled inputs and outputs and seperate gain controls for each of the two tracks for each input. It has the capability to switch tracks between input and output, or to combine both tracks at the output, leaving the second track free for SMPTE time code. The 6800 operates completely independently of the video switcher, and is capable of operation at different transition rates to that being used for the video switcher.

The 6403 Switcher-Editor interface coupled with the 6112 switcher and the 6800 Programmable Audio Mixer greatly increases the capability of your editing system. When the 6403 has the optional Editor Module, this combination can:

(a) Accept commands suchas pattern type, duration, input selection, directly from the editor keyboard.
(b) Perform a wipe to a preset limit and hold.
(c) Move a pattern from one preset position to another preset position, both size and position being controlled by the 6403, and triggered by the editor.
(d) Perform wipes and mixes that are absolutely frame accurate, with the start and finish occuring precisely at the designated frames.
(e) Switch or mix audio between VTR's, under control from the editor keyboard.
(f) Add voice over.



THIS DIAGRAM SHOWS THE VARIOUS POSSIBLE COMBINATIONS. Fig. 6.

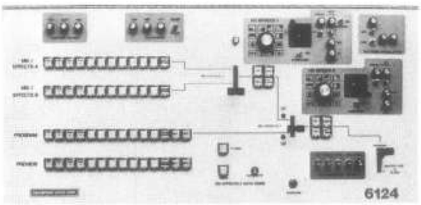
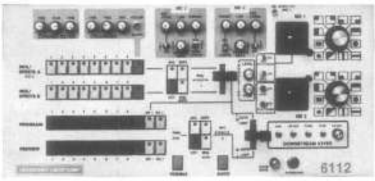
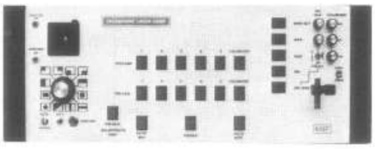
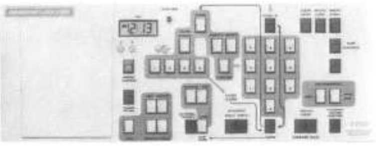
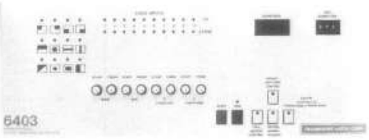
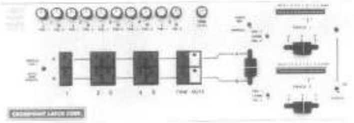
AUTO DRIVE™

AUTO DRIVE is an extremely powerful production and post-production tool. It controls the 6112 and 6124 series switchers. It is a computer which is capable of storing the entire control panel status of the switchers as many as 255 times, and retain it in a solid state memory. It can then be programmed to perform either smooth or abrupt transitions from one control panel status to another with frame accurate precision. The duration time for each transition may be from one frame to 3 minutes in the case of smooth transitions, and from one frame 99 minutes for abrupt transitions. An abrupt transition is one in which all the switcher functions are held stationary for the entire duration and then suddenly moved to the new status. In a smooth transition, the digital functions, such as pattern selection, input selection etc. are treated as abrupt, but the analog functions such as pattern size, pattern position, border color, etc., are smoothly varied from the switcher configuration in one "event" to the configuration in the following "event".

"Events" can be grouped into sequences. There is no limit to the number of allowable sequences. AUTO DRIVE can perform very rapid sequences of transitions with a high degree of precision. More importantly, since its computer is capable of controlling all the analog functions, it can generate effects which cannot possibly be reproduced manually. It can move, for instance, two patterns across the screen in different directions, while changing the hue, luminance, saturation and size of the borders. This kind of sophistication is a great help in reducing the number of edits in a post-production effort. AUTO DRIVE has been designed as a tremendous aid in inserting live segments in post-production. For instance when a narrator or announcer cuts in and out of shots, it permits groups of quick transitions to be programmed live, without the necessity of performing edits for each change.

The ability to perform accurately programmable transitions, and the capabiltiy of moving patterns across the screen in a single frame (without a bounce or lag) thereby simuluating edits, is one of the major assets of AUTO DRIVE.

AUTO DRIVE also has the ability to interface directly with editors, accepting and operating on commands from the editor keyboard. This feature simplifies most of the standard edits, which can be performed without touching the switcher or the AUTO DRIVE panel controls. On the other hand, when the need for more complex functions arises, the full power of the AUTO DRIVE computer is available, and can be triggered into action, by the editor "cut-in" pulse.

MODEL NO.	DESCRIPTION
6124	Four bus, twelve input (including colorizer) video switcher with two fully independent mix effects systems, downstream keyer, encoded chromakeyer, pattern modulator, automatic or manual mix and wipe, colorizer, dual pattern gererators with positioners, loop thru video inputs, take preview, toggle, adjustable soft and border effects, intercom, spot lite, dual back porch clamps, black burst output, blanking processor, master fade to black. Includes extender board and rack slides on electronic package. Control panel 30" x 14". 
6112	Four bus, nine input (including colorizer), video switcher with two fully independent mix effects systems, downstream keyer, pattern modulator, automatic or manual mix and wipe, colorizer, dual pattern generators with positioners, loop thru video inputs, take preview, toggle, adjustable soft and border effects, intercom, spot lite, dual back porch clamps, black burst output, blanking processor. Includes rack slides for electronics package and extender board. 
6107	Six input, (including colorizer), two bus video switcher, 12 patterns, positioner, automatic or manual mix and wipe, soft wipe, full preview, intercom, tally, blanking processor, loop thru video inputs, black burst output. Includes extender board. 
7200	AUTO DRIVE™ is a programmable computer controller for the 6112 and 6124 switchers. Unit stores configuration of switchers control panel as event. Capable of storing up to 255 events. Each event has a duration time of 1 frame to 99 minutes. 
6403	Programmable Editor-Switcher interface: allows most Crosspoint Latch switchers to communicate directly with VTR Editing Controllers. Performs a single event. 
6800	Programmable Audio Mixer (7 inputs) 1 KHz tone generator balanced inputs and outputs, two channels per input. Includes module for interface with editors. 

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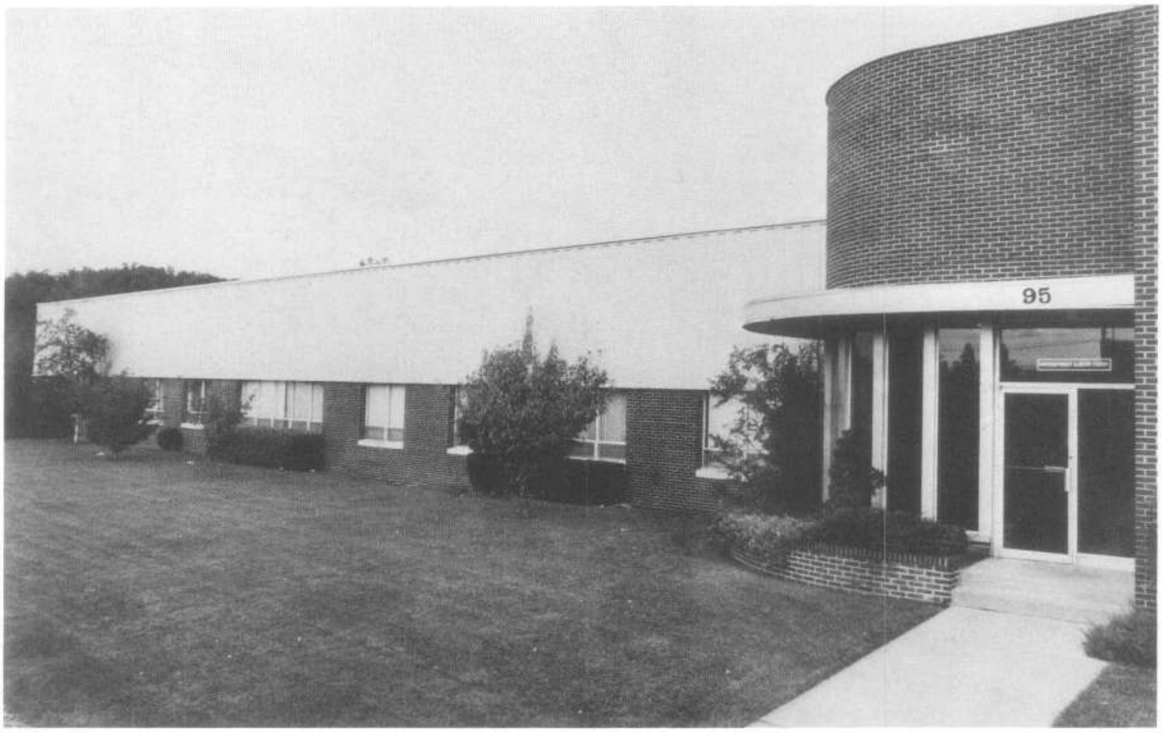

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